



Q Electromagnetic & Sensor Systems Department



SATELLITE COMMUNICATIONS AND THE AFLOAT ELECTROMAGNETIC COMPATIBILITY ANALYSIS PROGRAM (AESOP)

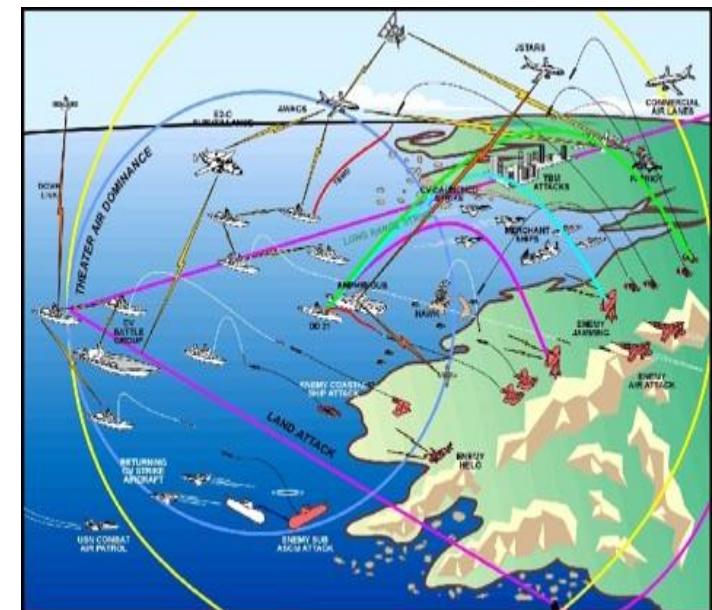
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Report Documentation Page			Form Approved OMB No. 0704-0188	
<p>Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.</p>				
1. REPORT DATE 2012	2. REPORT TYPE	3. DATES COVERED 00-00-2012 to 00-00-2012		
4. TITLE AND SUBTITLE Satellite Communications And The Afloat Electromagnetic Compatibility Analysis Program (AESOP)			5a. CONTRACT NUMBER	
			5b. GRANT NUMBER	
			5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)			5d. PROJECT NUMBER	
			5e. TASK NUMBER	
			5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Surface Warfare Center Dahlgren Division, 6149 Welch Rd, Ste 203, Dahlgren, VA, 22448			8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)			10. SPONSOR/MONITOR'S ACRONYM(S)	
			11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited				
13. SUPPLEMENTARY NOTES Presented at the 33rd annual U.S. Navy-U.S. Marine Corps (USN-USMC) Spectrum Management Conference, 27 February - 2 March 2012 in San Diego				
14. ABSTRACT				
15. SUBJECT TERMS				
16. SECURITY CLASSIFICATION OF: a. REPORT b. ABSTRACT c. THIS PAGE unclassified unclassified unclassified			17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 16
19a. NAME OF RESPONSIBLE PERSON				



Outline

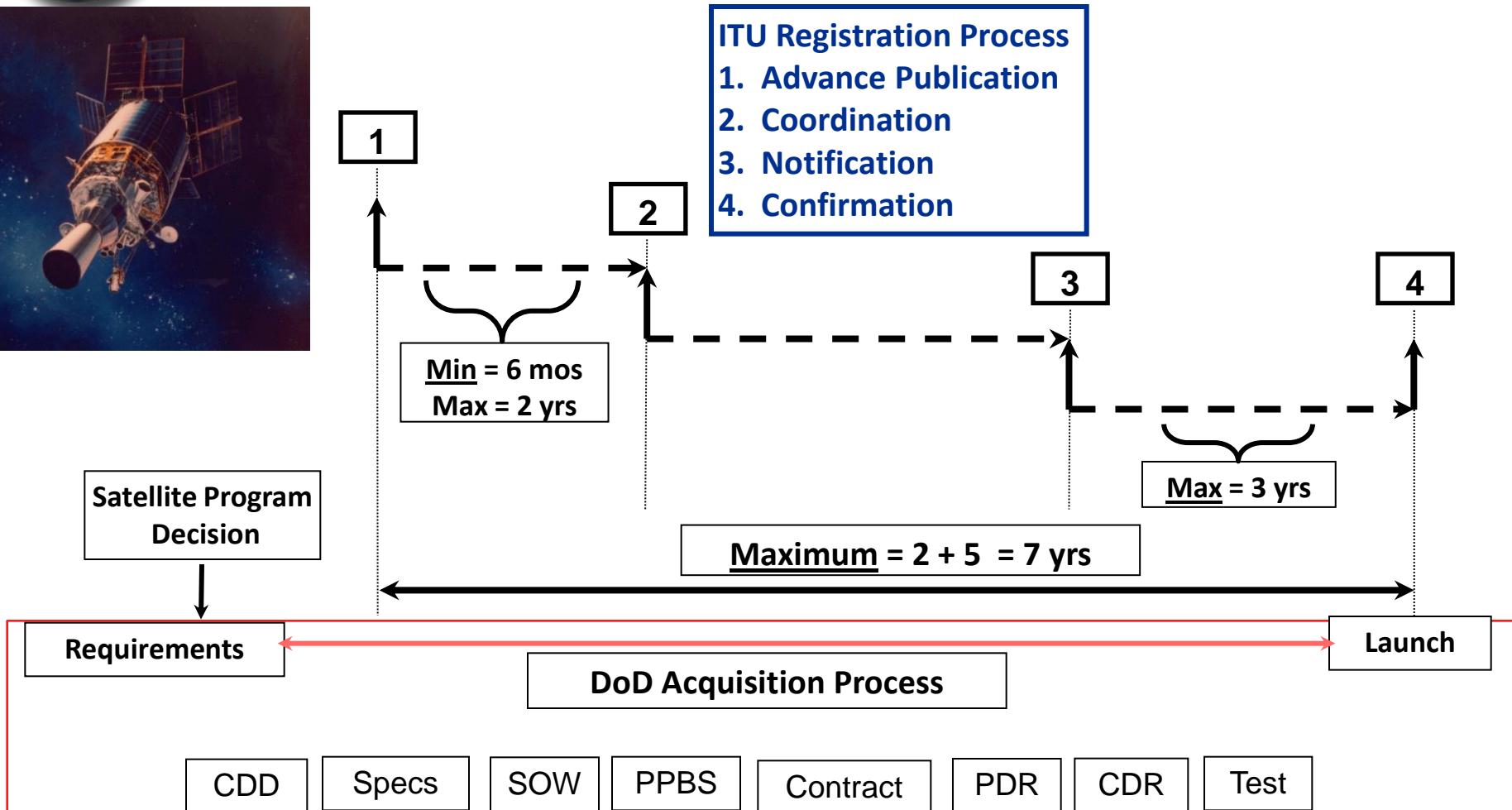
- **Satellite Registration**
- **Satellite Frequencies and the Operational Tasking Communication (OPTASK COMM)**
- **Satellite Frequencies and Radar Assignments**
- **Afloat Electromagnetic Spectrum Operations Program (AESOP) Demonstration**





Satellite Registration Process

4 Phases / 7 Years



Acronyms:
CDD: Capability Description Document

SOW: Statement of Work
PPBS: Plans, Programs, Budget System

PDR: Preliminary Design Review
CDR: Critical Design Review



Satellite Frequencies and the OPTASK COMM

- Satellite Access Requests (SAR)
 - Request to obtain uplink/downlink frequencies for Defense Satellite Communication System (DSCS), Commercial Wideband Satellite Program (CWSP), Commercial Broadband Satellite Program (CBSP), Extremely High Frequency (EHF)
- Satellite Access Assignment (SAA)
 - Provides satellite uplink/downlink frequencies for DSCS, CWSP, CBSP, EHF
- SATCOM Frequencies in the OPTASK COMM
 - UHF SATCOM frequencies are provided by the NCTAMS in the daily status message (2301Z)
 - SHF/EHF frequencies are provided to the ship(s) directly from the Regional Satellite Support Center (RSSC) via SAA.
 - OPTASK COMM Satellite Line Numbers are used to account for satellite frequencies.
 - Satellite frequencies documented in the OPTASK COMM will be analyzed by AESOP software for Electromagnetic Interference (EMI).



Satellite Frequencies and Radar Assignments

- Radar Planner and Communications Planners work together
 - Must share information to support Information Warfare (IW) and Command, Control, Communications and Computers (C4)
 - Supports IW requirements, deny spectrum from our enemies while providing rapid and reliable communications
- Communications planner distributes OPTASK COMM to Radar Planner
 - Radar Planner imports OPTASK COMM into AESOP prior to generating Radar Assignments
 - AESOP generates Radar assignments to minimize EMI to communications systems from Radar & Electronic Warfare (EW) systems



Satellite Frequencies and AESOP EMI Analysis

RONALD REAGAN EMI Victims

Select an EMI Victim

Victim	Priority	Frequency MHz	JRFL
SPS-48E(V)10	Neutral	2939.00 - 3058.00	
SPS-49A(V)1	Neutral	881.33 - 910.22	
SPS-67(V)1	Neutral	5781.00	
SPS-73(V)17	Neutral	9405.00	
UPX-27 INTERROGATOR	Neutral	1090.00	
UPX-27 TRANSPONDER	Neutral	1030.00	
USC-38 NO. 1 (ST802B)	Neutral	20700.00	
VHF BRIDGE-TO-BRIDGE NO. 1 (LP158)	Neutral	156.80	
WSC-6 NO. 1 (ST800B)	Neutral	7710.00	
WSC-8 NO. 1 (ST801B)	Neutral	3744.00	

OK Report Help

Cumulative EMI Level:

Score: 0

Sources of EMI to Selected Victim

Platform	Source	EMI Level	Frequency (MHz)
No EMI Predicted.			

Example EMI Victims Dialog



Satellite Recap

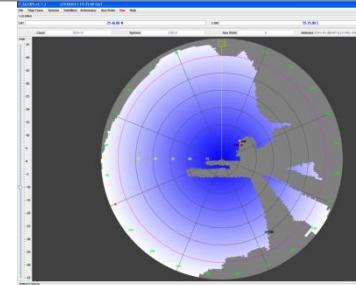
- **Satellite Frequencies and the OPTASK COMM**
 - Add SATCOM frequencies to the OPTASK COMM to avoid EMI from high powered radar systems to co-located satellite systems operating in the same bands
 - Improve reliability to critical satellite links such as DSCS, CWSP
- **Satellite Frequencies and Radar Assignment Generation**
 - Consider OPTASK COMM frequencies during AESOP's EMI analysis
 - Provide radar frequency plan that minimizes EMI to satellite and terrestrial communications nets and links
- **AESOP Software Demo**



AESOP Core Elements

➤ Build/Gather/Input Deployment Data

- Phases/Areas of Operations
- Participants
- Net Plans



➤ Request Spectrum Management Data

- Equipment Inventory
- Frequencies

➤ Receive/Input Spectrum Management Data

- Import of Equipment Inventory
- Import of Frequency Assignments

➤ Create/Distribute Frequency Plan

- OPTASK COMM, Radar Assignments, SFAF

➤ Monitor Spectrum Usage

- Identify EMI/Connectivity Issues





DEMO

- Demo is built using the Instructional Use Unclassified database with default FY2011 Reagan Strike Group (SG)
- Sample Local Area Frequency Assignment is included
- Demonstration will show that by including SATCOM uplinks and downlinks in the Net Plan, potential EMI issues from shipboard radar systems can quickly be identified and mitigated
- AESOP strives to avoid EMI to any terrestrial and/or SATCOM frequencies in Net Plan when regenerating new Radar Assignments



Questions?

Comments?



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NAVAL SURFACE WARFARE CENTER
DAHLGREN DIVISION

Distribution Statement A: Unlimited Distribution



BACKUP SLIDES

- Phases of Satellite Registration Process:
 - API
 - CRC
 - Notification
 - Confirmation



Phase 1: Advance Public Information (API)

- Administration Submits API to International Telecommunications Union (ITU)
 - 2 to 7 Years Prior Planned Launch/Operational
 - General Information / Identity of the Network
- ITU
 - Reviews API for Completeness
 - Distributes to Its Members
- ITU Members
 - Review API; Identify and Provide Initial (Interference) Concern/s to Filing/Registration Administration



Phase 2: Satellite Coordination Request (CRC)

- Administration Submits CRC to ITU
 - Between 6 Months to 2 Years after submitting API
 - Detail Identity of the Network
 - Specific Frequency Band(s) , Orbital Slot, Planned Operational Date,
 - Transponder RF Characteristics (Power, Bandwidth, Antenna Gain/Pattern)
 - Associated Earth Station and Service Area
- ITU
 - Reviews CRC for Completeness/Conformance
 - Distributes to Its Members



Phase 2 (Continued): CRC

- ITU Members
 - Review CRC; Provide Specific Interference Concern/s to Filing/Registration Administration
 - Based on Frequency Overlapping, Closed Orbital Separations, Co-Located Service of filing Networks
- Filing/Registration Administration
 - Contacts Concerned Administration to initiate Coordination
- Coordination
 - Administration - Administration, or Operator - Operator
 - Long Process (Negotiations)
 - **End Result:** Eliminated/Minimized Potential for RF Interferences between Networks and Obtained Agreements from Affected/Concerned Administrations



Phase 3: Notification & Phase 4: Confirmation

- Phase 3: Notification to ITU
 - Provide Status of Completed Coordination/Obtained Agreements With All Affected/Concerned Administrations
- Phase 4: Confirmation
 - Launched Satellite – Within 7 years of API Date
 - Send Confirmation (Satellite On-Orbit)
 - Established “Date of Bringing Into Use” -- Operational Date --
- If Didn’t Launch Satellite within the 7 Years Filing Period
 - ITU Cancels Filing
 - Re-file (Go Back to Phase 1)
 - Lost Priority